

REMARKS

By this amendment, applicants have amended claims 1-5, 8, 10 and 13, and have added claims 16-18 to more clearly define their invention. See, e.g., Figs. 5-7.

Claims 1-3, 8, 10 and 15 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 4,147,927 to Pirotte. Applicants traverse this rejection and request reconsideration thereof.

The present invention relates to a heating device with at least two plate-like ceramic heating elements that are electrically contacted on opposite flat sides. On one flat side of the heating elements there are at least two flat electrical conductors which are electrically insulated against one another, each of the flat electrical conductors being in contact with a flat side of at least one heating element.

US Patent No. 4,147,927 to Pirotte shows an electric heating device with two flat cylindrical PTC elements which have both a cylindrical circumferential wall and two parallel fiat end faces. In addition, three electrical conductors 9, 10 and 23 are provided. One of the conductors, conductor 9, contacts two PTC elements 21, 22 on one of its end faces, in each case the top end face. Another conductor, conductor 10, runs along PTC element 21 along with an interposed insulating layer 24 so that this conductor does not contact this element. The conductor extends up to another PTC element 23 and contacts this element on one flat end face, the lower flat end face. Conductors 9, 10 are not flat conductors but are instead contoured or shaped conductors, as is evident in the cross-section of Figures 2 and 3, or, on the other hand, solid elements of partially arcuate cross-section, as is evident in Figure 4.

Figure 5 of Pirotte shows another conductor 23 which contacts first PTC element 21 not on one of its flat end faces but instead on the cylindrical

circumferential wall. In order to ensure that an effectively reliable electrical contact is created, conductor 23 must be permanently joined to PTC element 21, specifically, by welding or soldering - unlike the connection to conductors 9, 10, which are pressed on simply by an electrical application pressure against the end faces of elements 21, 22 (for conductor 9) or solely of element 22 (for conductor 10).

According to the present invention, on the other hand, all conductors contact the resistor elements present (PTC elements) on their end faces. Accordingly, the claimed invention differs from the subject matter of Pirotte in that, first of all:

- the conductors of the present invention are flat conductors;
- two conductors are present on at least one side of the PTC elements, which conductors are insulated from each other according to the present invention whereas, in Pirotte, conductor 23 is located not on one of the two sides of the PTC elements but at a level that is approximately in the middle of said elements; and
- the at least two, mutually insulated conductors located on one side of the PTC elements contact each PTC element on one flat end face (e.g., both conductors 5.1 and 5.2 electrically contact the flat faces of PTC elements 6.1 and 6.2, respectively in Figs. 5-7), whereas, in Pirotte, conductor 23 does not contact PTC element 21 on one flat end face but on the cylindrical side wall.

The disadvantage of the prior art, such as Pirotte, is that contacting is implemented not simply by clamping; instead, conductor 23 must be soldered or welded to PTC element 21, thereby requiring an additional fabrication step. Conversely, the advantage of the present invention is the fact that this production step is obviated and that all of the conductors can contact the PTC elements simply by tensioning/deforming them.

For the foregoing reasons, the Pirotte patent does not anticipate the presently claimed invention.

Claims 4, 5, 9, 11 and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Pirotte in view of U.S. Patent No.4,838,370 to Van Bokestal et al. Applicants traverse this rejection and request reconsideration thereof.

The Examiner has cited the Van Bokestal et al patent as allegedly teaching the use of a conductive spacer. However, the element 4 to which the Examiner refers is a semi cylindrical metal body that appears to be the conductive contact itself not a spacer. In any event, the Examiner has not even alleged there to be anything in Van Bokestal et al that would have suggested modifying the teachings of Pirotte to overcome the basic deficiencies thereof noted above. Accordingly, claims 4, 5, 9, 11 and 12 are patentable at least for the reasons noted above.

Claims 13 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Pirotte in view of U.S. Patent No.4,990,748 to Starck. Applicants traverse this rejection and request reconsideration thereof.

The patent to Starck discloses An apparatus for heating gases, particularly air, with a heating unit having a mounting part, at least one PTC component, at least one insulating frame part surrounding the latter, at least one contact plate and at least one insulating support. The PTC component is surrounded by the frame part being inserted in the mounting part and on at least one flat side rests a contact plate and is covered by an insulating support. Heat emission lamellas are mounted in a clamping manner on the heating unit to ensure an effective heat emission to the surrounding air or gas.

The Starck patent does not disclose a system with multiple conductors arranged on one side of a series of PTC elements such that different FTC elements can be contacted by different connecting lines. Accordingly, the Starck patent does not remedy the basic deficiencies of Pirotte noted above. Therefore, claim 13 is patentable over the proposed combination of patents.

Claims 6, 7 and 14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Pirotte in view of U.S. Patent No.4,327,282 to Nauerth. Applicants traverse this rejection and request reconsideration thereof.

The patent to Nauerth discloses an electrical resistance-heating element having at least one heating conductor of positive-temperature-coefficient material having contact means on opposite surfaces. If more than one heating element is provided, they may be arranged in a row or in a stack. Electrical connection is made to the heating conductor or the row or stack through two substantially plane contact plates adapted to the layout of the heating conductor, row or stack and placed loosely upon opposite contact surfaces thereof. The components are held together elastically by securing means holding the edges of the contact plates. However, nothing in Nauerth remedies the basic deficiencies of Pirotte noted above. Therefore, claims 6, 7 and 14 are patentable over the proposed combination of patents.

New claims 16-18 are also patentable over the references applied by the Examiner. That is, none of the references discloses or would have suggested a heating device with at least two plate-like ceramic heating elements, which are electrically contacted on opposite flat sides and on at least one side is provided at least one flat, electrical conductor, wherein on one side of the heating elements there

are at least two flat conductors which are electrically insulated against one another, each of the at least two flat conductors being in contact with at least one heating element and wherein at least one of the two flat electrical conductors is in indirect contact with a flat side of at least one of the heating elements. Specifically, the references, including Pirotte, do not disclose a heating device in which one of the multiple flat conductors located on one side contacts at least one of the PTC elements only indirectly, such as through an electrically conductive spacer.


In view of the foregoing comments and amendments, favorable reconsideration and allowance of all claims presently in the application, are requested.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus, LLP Deposit Account No. 01-2135 (Docket No. 321.43752X00), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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